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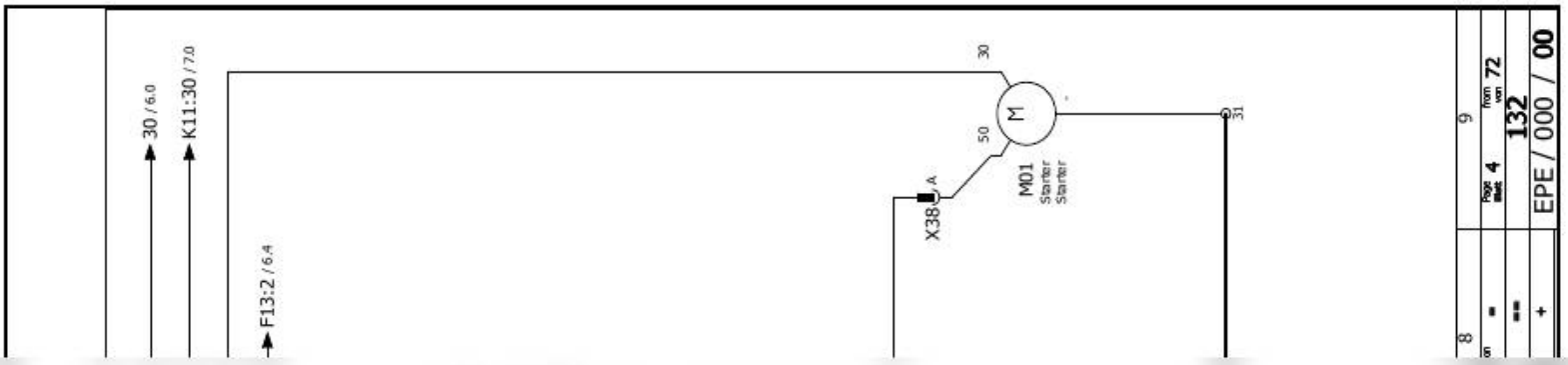
## 4.5 Maintenance table

| No. | Maintenance work | Comment | every 10 operating hours, daily | every 250 oper. hours | every 500 oper. hours | every 1000 oper. hours | every 2000 oper. hours | every 3000 oper. hours | every 6000 oper. hours | as required |
|---|---|---|---|---|---|---|---|---|---|---|
| 5.6 | Check the engine oil level | Dipstick mark | X | | | | | | | |
| 5.7 | Check the fuel level | Fuel level gauge | X | | | | | | | |
| 5.8 | Check the coolant level | Inspection glass | X | | | | | | | |
| 5.9 | Check the hydraulic oil level | Inspection glass | X | | | | | | | |
| 5.10 | Check the tire pressure | | | X | | | | | | |
| 5.11 | Clean the cooling fins on engine and hydraulic oil cooler | | | X | | | | | | |
| 5.12 | Check the oil level in the drive axle | | | X | | | | | | |
| 5.13 | Check the oil level in the wheel hubs | | | X | | | | | | |
| 5.14 | Check the oil level in the axle reduction gear | | | X | | | | | | |
| 5.15 | Check the oil level in the drum reduction gear | | | X | | | | | | |
| 5.16 | Check the oil level in the vibration bearings | | | X | | | | | | |
| 5.17 | Check, replace the refrigerant compressor V-belt | | | X | | | | | | |
| 5.18 | Change engine oil and oil filter* | see foot note<br>min. 1x per year | | | X | | | | | |
| 5.19 | Check the water separator | | | | X | | | | | |
| 5.20 | Drain the fuel tank sludge | | | | X | | | | | |
| 5.21 | Battery service | pole grease | | | X | | | | | |
| 5.22 | Service the air conditioning | | | | X | | | | | |
| 5.23 | Clean the circulation air filter for the heating | | | | X | | | | | |
| 5.24 | Change the bypass filter** | see foot note<br>min. 1x per year | | | X | | | | | |
| 5.25 | Check / replace the ribbed V-belt | | | | | X | | | | |
| 5.26 | Replace the fuel filter cartridge | | | | | X | | | | |
| 5.27 | Change the fuel pre-filter cartridge | | | | | X | | | | |

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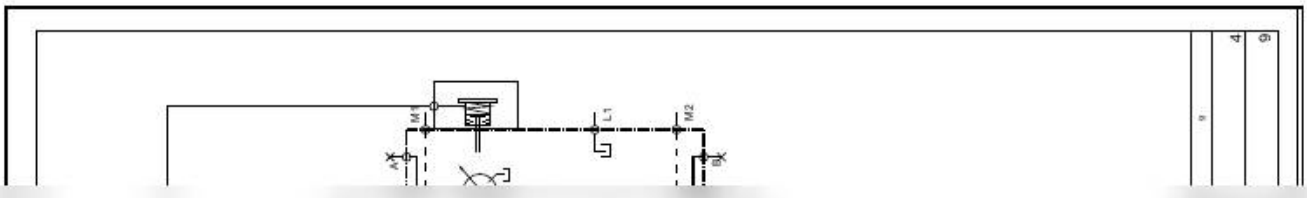
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| Error code SERDIA | Component / Location | Description (Error location) | Defined for DCR | Defined for DMV | ID | Blink code | SPN | FMI | Self-curing[1] |
|---|---|---|---|---|---|---|---|---|---|
| 11 | Air filter condition | Pressure loss above target range with system reaction | ● | ● | AirFltSysReac | 1-3-6 | 107 | 0, 11 | ● |
| 12 | Accelerator pedal | Cable break or short circuit, signal implausible compared to signal of idle sensor (analog pedal) | ● | ● | APP1 | 2-2-6 | 91 | 2, 3, 4, 11 | |
| 14 | Accelerator pedal | Cable break or short circuit, bad PWM signal range or frequency (digital pedal) | ● | ● | APPPwm | 2-2-2 | 91 | 2, 8 | ● |
| 15 | Accelerator pedal | Bad PWM pulse-width repetition rate (digital pedal) | ● | ● | APPPwmPer | 2-2-2 | 91 | 8, 11 | ● |
| 16 | ECU internal error | Ambient pressure sensor defective | ● | ● | APSCD | 2-9-2 | 108 | 2, 3, 4, 11 | ● |
| 17 | Air heater relay | Cable break or short circuit | ● | ● | ArHt1 | 2-6-3 | 729 | 3, 4, 5, 11 | ● |
| 18 | Air heater magnetic valve | Cable break or short circuit | ● | ● | ArHt2 | 2-6-3 | 730 | 3, 4, 5, 11 | ● |
| 19 | Air heater relay | Cable break or wrong connection | ● | ● | ArHtCD_NoLd | 2-6-3 | 676 | 4, 11 | |
| 20 | Air heater relay | Inoperable during shut-off | ● | ● | ArHtCD_RlyErr | 2-6-3 | 676 | 2, 5, 11 | |
| 22 | Battery | Voltage below target range | ● | ● | BattCD | 3-1-8 | 168 | 0, 1, 11 | ● |
| 23 | Battery voltage | Above target range with system reaction | ● | ● | BattCDSysReac | 3-1-8 | 168 | 2, 11 | ● |
| 24 | Begin of injection period | Outside target range or missing (cylinder 1) | | ● | BIPCyl1 | 5-3-1 | 523561 | 2 | ● |
| 25 | Begin of injection period | Outside target range or missing (cylinder 2) | | ● | BIPCyl2 | 5-3-2 | 523562 | 2 | ● |
| 26 | Begin of injection period | Outside target range or missing (cylinder 3) | | ● | BIPCyl3 | 5-3-3 | 523563 | 2 | ● |
| 27 | Begin of injection period | Outside target range or missing (cylinder 4) | | ● | BIPCyl4 | 5-3-4 | 523564 | 2 | ● |
| 28 | Begin of injection period | Outside target range or missing (cylinder 5) | | ● | BIPCyl5 | 5-3-5 | 523565 | 2 | ● |
| 29 | Begin of injection period | Outside target range or missing (cylinder 6) | | ● | BIPCyl6 | 5-3-6 | 523566 | 2 | ● |
| 30 | Begin of injection period | Outside target range or missing (cylinder 7) | | ● | BIPCyl7 | 5-3-7 | 523567 | 2 | ● |
| 31 | Begin of injection period | Outside target range or missing (cylinder 8) | | ● | BIPCyl8 | 5-3-8 | 523568 | 2 | ● |
| 32 | Charge air pressure sensor | Cable break or short circuit | ● | ● | BPSCD | 2-2-3 | 102 | 2, 3, 4 | ● |
| 33 | Charge air pressure | Outside target range with system reaction | ● | ● | BPSCDSysReac | 2-2-3 | 102 | 2, 11 | ● |
| 37 | Coolant level | Outside target range with system reaction | ● | ● | CLSCDSysReac | 2-3-5 | 111 | 1, 11 | |
| 38 | Single cylinder | Misfire detected (cylinder 1) | ● | ● | CmbChbMisfire1 | 2-4-1 | 1323 | 11, 12 | |
| 39 | Single cylinder | Misfire detected (cylinder 2) | ● | ● | CmbChbMisfire2 | 2-4-1 | 1324 | 11, 12 | |
| 40 | Single cylinder | Misfire detected (cylinder 3) | ● | ● | CmbChbMisfire3 | 2-4-1 | 1325 | 11, 12 | |
| 41 | Single cylinder | Misfire detected (cylinder 4) | ● | ● | CmbChbMisfire4 | 2-4-1 | 1326 | 11, 12 | |
| 42 | Single cylinder | Misfire detected (cylinder 5) | ● | ● | CmbChbMisfire5 | 2-4-1 | 1327 | 11, 12 | |
| 43 | Single cylinder | Misfire detected (cylinder 6) | ● | ● | CmbChbMisfire6 | 2-4-1 | 1328 | 11, 12 | |
| 44 | Single cylinder | Misfire detected (cylinder 7) | | ● | CmbChbMisfire7 | 2-4-1 | 1450 | 11, 12 | |
| 45 | Single cylinder | Misfire detected (cylinder 8) | | ● | CmbChbMisfire8 | 2-4-1 | 1451 | 11, 12 | |
| 46 | Multiple cylinders | Misfire detected | ● | ● | CmbChbMisfireMul | 2-4-1 | 1322 | 11, 12 | |
| 47 | Misfire | Misfire detected with system reaction | ● | | CmbChbSysReac | 2-4-1 | 1346 | 0, 11 | |

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## 12.10Check the engine oil level

**⚠ Danger**

**Danger of injury!**

**Support the engine hood for all maintenance and repair work.**

**i Note**

*The machine must be parked horizontally with the engine shut down.*

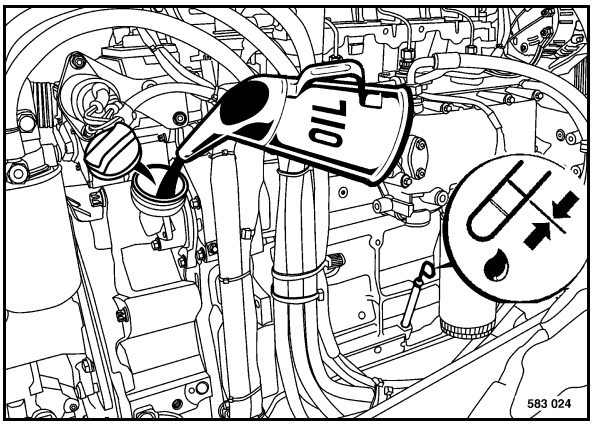



Fig. 3

- Pull the dipstick (Fig. 3) out, wipe it off with a lint-free, clean cloth and reinsert it until it bottoms.
- Pull the dipstick back out again.
- If the oil level is below the "MAX" mark fill in oil.
- If the oil level is above the “MAX” mark, determine the cause and drain off oil.

**⚠ Caution**

**Before longer work periods you should always top the oil up to the "MAX"-mark.**

**For quality and quantity of oil refer to the table of fuels and lubricants**

## 12.11Changing engine oil and oil filter cartridges

**⚠ Caution**

**The oil change at 500 operating hours refers to the use of oils of oil quality class API CG-4/CH-4 or ACAE E3-96/E5-02 respectively.**

**Refer also to the chapter 5.2, fuels and lubricants.**

**Drain the engine oil only when the engine is warm.**

**⚠ Danger**

**Danger of scalding!**

**When draining off hot oil.**

**By hot oil when unscrewing the engine oil filter.**

**Environment**

**Catch running out oil and dispose of environmentally together with the engine oil filter cartridge.**

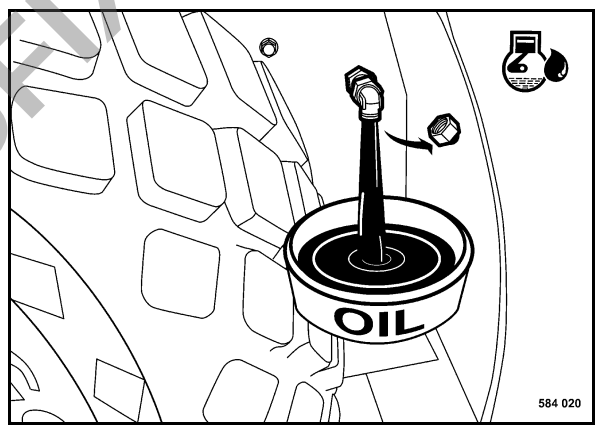



Fig. 4

- Unscrew the drain plug (Fig. 4) and catch running out oil.
- Turn the drain plug tightly back in.

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## Important notes

**These safety regulations must be read and applied by every person involved in the repair /maintenance of this machine. The applicable accident prevention instructions and the safety regulations in the operating and maintenance instructions must be additionally observed.**

**Repair work shall only performed by appropriately trained personnel or by the after sales service of BOMAG.**

**Workshop equipment and facilities as well as the use and waste disposal of fuels and lubricants, cleaning agents and solvent as well as gases and chemicals are subject to legal regulations, which are intended to provide a minimum on safety. It is obviously your own responsibility to know and adhere to these regulations.**

This manual contains headers like "Note", "Attention", "Danger" and "Environment", which must be strictly complied with in order to inform about and avoid dangers to persons, property and the environment.

**i Note**

*Paragraphs marked like this contain technical information for the optimal economical use of the machine.*

**⚠ Caution**

**Paragraphs marked like this highlight possible dangers for machines or parts of the machine.**

**⚠ Danger**

**Paragraphs marked like this highlight possible dangers for persons.**

**Environment**

**Paragraphs marked like this point out practices for safe and environmental disposal of fuels and lubricants as well as replacement parts.**

**Observe the regulations for the protection of the environment.**

## General

- For repair and maintenance work move the machine on a firm base and shut it down.
- Always secure the machine against unintended rolling.
- Secure the engine reliably against unintentional starting.
- Mark a defective machine and a machine under repair by attaching a clearly visible warning label to the dashboard.
- Block the articulated joint with the articulation lock.
- Use protective clothes like hard hat, safety boots and gloves.
- Keep unauthorized persons away from the machine during repair work.
- Tools, lifting gear, lifting tackle, supports and other auxiliary equipment must be fully functional and in safe condition.
- Use only safe and approved lifting gear of sufficient load bearing capacity to remove and install parts or components from and to the machine.
- Do not use easily inflammable or harmful substances, such as gasoline or paint thinners for cleaning.
- Do not smoke or use open fire and avoid sparks when cleaning or repairing a tank.
- When performing welding work strictly comply with the respective welding instructions.

## Transport work with cranes and lifting tackle

**i Note**

*Cranes must only be operated by instructed persons who had been trained in handling cranes.*

- Follow the operating instructions of the manufacturer when working with cranes.
- Follow the operating instructions of the operator when working with cranes.
- Always comply with the applicable accident prevention instructions when working with cranes and lifting tackle.

## Precautions and codes of conduct for welding work

Welding work must only be carried out by properly trained personnel.

**⚠ Danger**

**Electric shock!**

**Sparks, fire hazard, burning of skin!**

**Infrared or ultraviolet radiation (arc), flashing of eyes!**

**Health hazard caused by welding work on highly alloyed work pieces, metal coatings, paint coatings, plastic coatings, oil containing dirt deposits, grease or solvent residues, etc.!**

- Check welding equipment and cables for damage before use (also the validity of inspection stickers).
- Ensure good conductivity between ground cable and workpiece, avoid joints and bearings.

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| * | | BW 214 DH-4 | BW 214 PDH-4 |
|---|---|---|---|
| Type of steering | | Oscill.-articul. | Oscill.-articul. |
| Steering operation | | hydrostatic | hydrostatic |
| Steering/oscillation angle | ± ° | 35/12 | 35/12 |
| Inner track radius | mm | 3494 | 3494 |
| **Vibration** | | | |
| Drive system | | hydrostatic | hydrostatic |
| Frequency 1/2 | Hz | 30/36 | 30/36 |
| Amplitude 1/2 | mm | 2.00/1.00 | 1.80/0.94 |
| Centrifugal force 1/2 | kN | 300/225 | 300/225 |
| **Drums and tires** | | | |
| Tire size | | 23.1-26/12PR | 23.1-26/12PR |
| Air pressure, nominal value | bar | 1.4 | 1.4 |
| Air pressure, span | bar | 0.8 - 1.4 | 0.8 - 1.4 |
| Padfeet, quantity | | | 150 |
| Height of padfeet | mm | | 100 |
| Area of one padfoot | $cm^2$ | | 137 |
| **Filling capacities** | | | |
| motor | l | 15.5 | 15.5 |
| Fuel | l | 340 | 340 |
| Hydraulic oil | l | 60 | 60 |
| Coolant | l | 16 | 16 |

* The right for technical modifications remains reserved

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## 6.4 Batteries

### Battery – accumulator

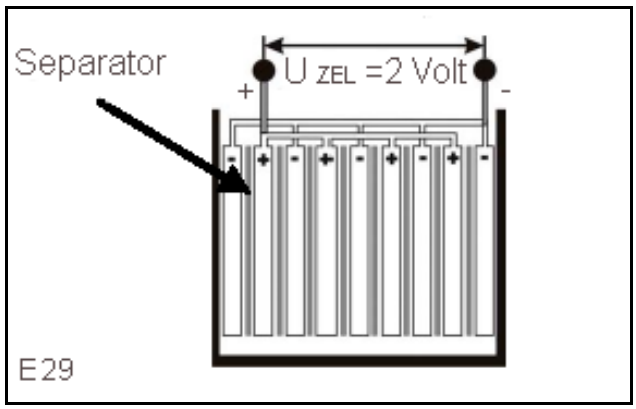



Fig. 1

In vehicles batteries are used to start the engine. The ability to start the engine depends on the charge condition of the batteries.

Lead collectors or accumulators are secondary elements, i.e they can be recharged after discharging electric current.

The basic element of a lead accumulator is the cell. It contains the plate blocks consisting of positive and negative plates. These plates are separated from each other by separators.

All positive plates are arranged parallel to the plus pole, the negative plates parallel to the minus pole of the cells.

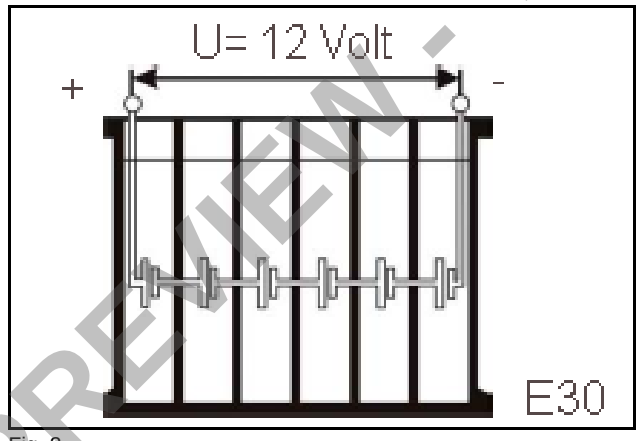



Fig. 2

All cells are filled with a conductive fluid, the electrolyte. For a 12 Volt battery 6 cells are connected in series.

### Capacity

is a synonym for the amount of current taken up and discharged by a battery over a specified period of time.

### Battery maintenance

**i Note**

*Maintenance free batteries are gaining more and more significance, this freedom from maintenance, however, is only limited to the fact that no water needs to be added.*

If the battery is not charged and discharged over a longer period of time, the battery will slowly discharge by itself.

The accumulator may only be discharged down to a final discharging voltage of 10.5 Volt, as otherwise there is a risk of sulphation, i.e. the generated lead sulphate forms increasingly coarser crystals, which will finally not react at all or only very sluggishly during a subsequent charging process.

In the worst case the accumulator can only be disposed of after such an exhaustive discharge.

The following therefore applies for longer downtimes:

- Remove the battery and store it in a cool, dry and frost protected room.
- Check the open circuit voltage on the battery at regular intervals (at least once every month).
- Recharge immediately if the open circuit voltage has dropped to 12.25 Volt (no rapid charging).

**i Note**

*The open circuit voltage of batteries occurs approx. 10 h after the last charging or approx. 1 h after the last discharge.*

### Battery test in general

- Is the battery leaking? Can traces of impact, shock or compression be found in the leaking area?
- Check for e.g. incorrect fastening, foreign bodies on the battery mounting surface and similar.

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| PIN travel lever | Signal description | Nominal values (voltage / current) |
|---|---|---|
| | Digital input active high | High amplitude inactive ☞ approx.12 V |
| X24:3 | Input **low amplitude**<br>Digital input active high | Low amplitude active ☞ approx.12 V<br>Low amplitude inactive ☞ approx.12 V |
| X24:4 | Not used | --- |
| X24:5 | Not used | --- |
| X24:6 | Input **arm rest left (not yet realized)**<br>Digital input active high | --- |
| X24:7 | Output **voltage supply for additional digital evaluations**<br>This output supplies the amplitude selector switch. This voltage is required to connect and evaluate further digital switches to the travel lever. | Voltage supply active ☞ approx.12 V<br>Voltage supply inactive ☞ 0 V |
| X24:8 | Output **voltage supply ground potential**<br>In connection with PIN X24:7 this output enables the control of additional components (relays, displays etc.) | 0V (measured against ground) |

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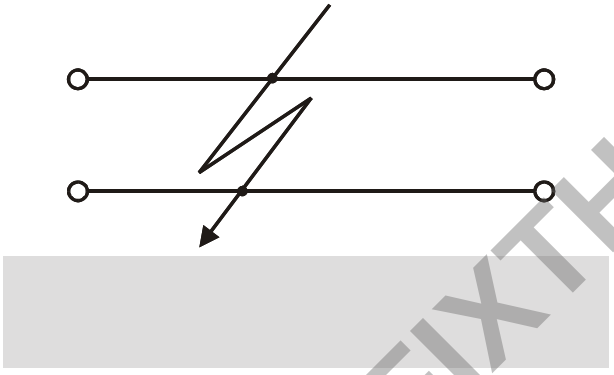




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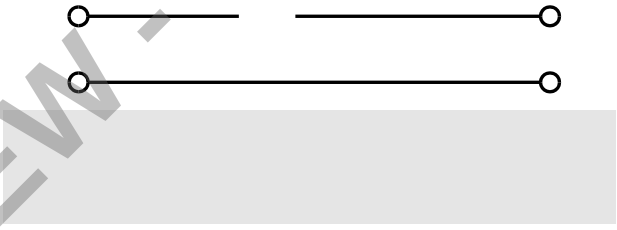
## 16 Terminology in connection with ESX

**Short circuit**
A direct, unwanted connection between two different cables or between machine and cables.
Examples:
Two lines rub against each other until the insulation has worn off.
A conductive line rubs off the insulation at the vehicle ground.



**Wire breakage**
This generally means that a connection is interrupted. Possible reasons may be:

**Line:**
torn (not necessarily visible from outside)
rubbed through
chafed mostly in connection with a *short circuit to ground*

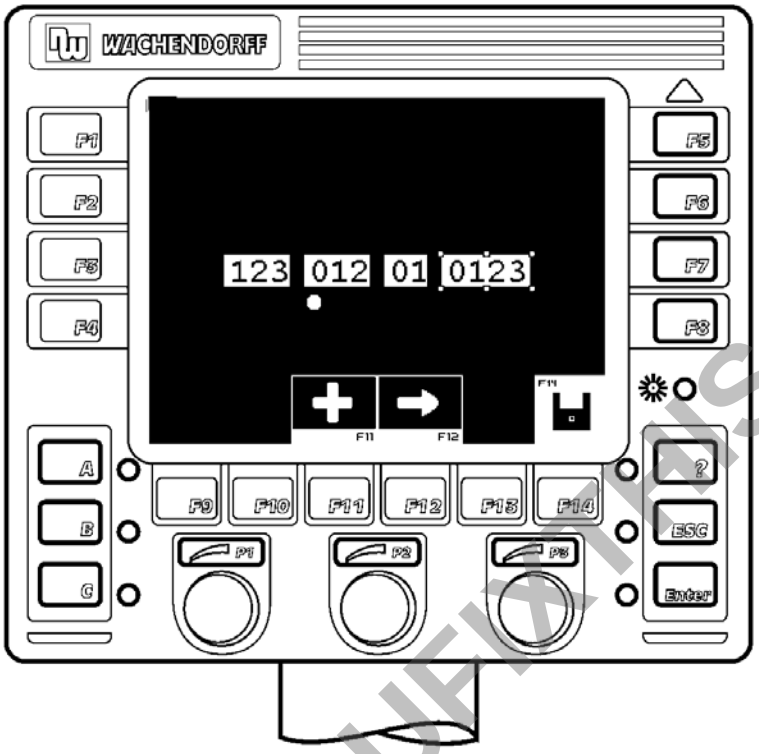


**Terminal, cable lug**
loosened, slipped off
broken off,
corroded,
socket / plug faulty

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- The desired printout language can be selected by pressing the keys "F11" and "F12".
- After the adjustment press key"F14" to save the adjustment. The symbol (F14) lights green for a moment as a sign of confirmation.
- Press "ESC" to exit the screen page.

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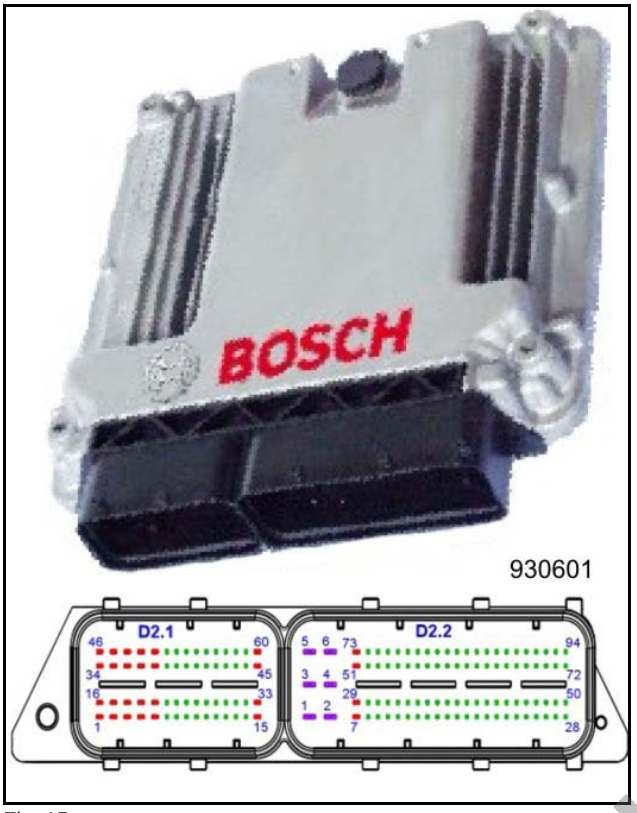



Fig. 15

The EMR3-S (TCD 2012 and TCD 2013) (Fig. 15) engine control unit is fitted with two sockets on the front side of the housing:

- socket D2.1 to connect the engine wiring loom,
- socket D2.2 to connect the vehicle wiring loom.

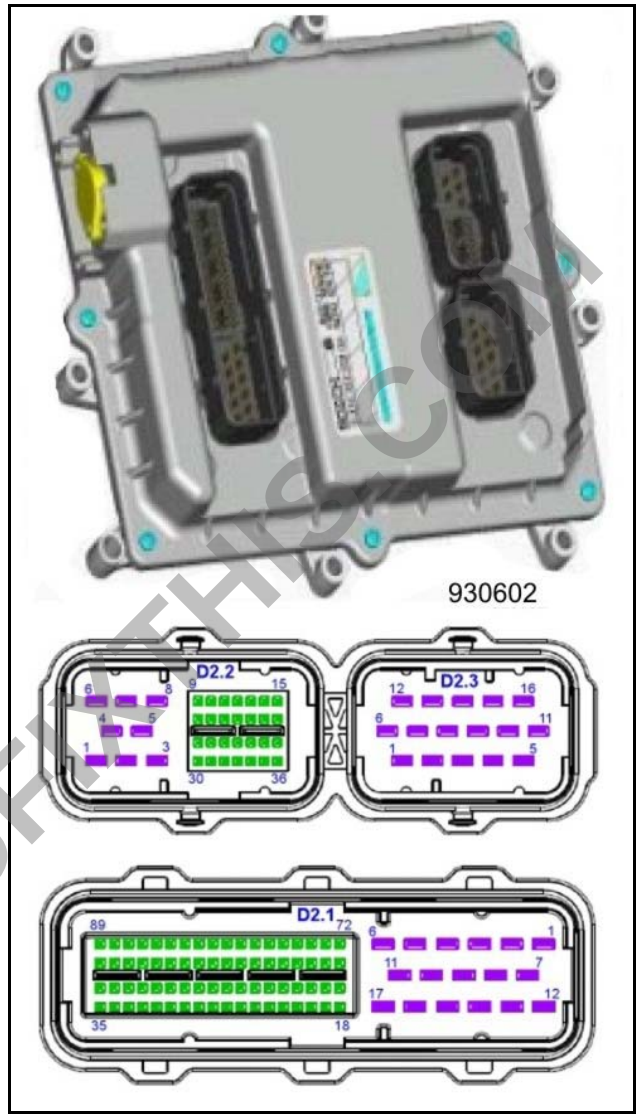



Fig. 16

The EMR3-E (TCD 2015) (Fig. 16) engine control unit is fitted with three sockets on the upper side of the housing:

- socket D2.1 to connect the vehicle wiring loom,
- socket D2.2 to connect the engine wiring loom for sensors and actuators,
- socket D2.3 to connect the engine wiring loom for fuel metering unit and injection valves.

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| Error code SERDIA | Component / Location | Description (Error location) | Defined for DCR | Defined for DMV | ID | Blink code | SPN | FMI | Self-curing[1] |
|---|---|---|---|---|---|---|---|---|---|
| 192 | CAN bus off-state | Cable break or short circuit, off-state (CAN bus A) | ● | ● | NetMngCANAOff | 2-7-1 | 639 | 11, 14 | ● |
| 193 | CAN bus off-state | Cable break or short circuit, off-state (CAN bus B) | ● | ● | NetMngCANBOff | 2-7-1 | 1231 | 11, 14 | ● |
| 194 | CAN bus off-state | Cable break or short circuit, off-state (CAN bus C) | ● | ● | NetMngCANCOff | 2-7-1 | 1235 | 11, 14 | ● |
| 195 | Oil pressure warning lamp | Cable break or short circuit | ● | ● | OPLpCD | 1-3-5 | 705 | 2, 3, 4, 5 | |
| 196 | Oil pressure sensor | Cable break or short circuit | ● | ● | OPSCD | 2-2-4 | 100 | 0, 2, 3, 4 | ● |
| 197 | Oil pressure sensor | Pressure value implausible low | ● | ● | OPSCD1 | 2-3-1 | 100 | 1, 11 | ● |
| 198 | Oil pressure | Above target range | ● | ● | OPSCDSysReacHi | 2-3-1 | 100 | 0, 11 | ● |
| 199 | Oil pressure | Below target range | ● | ● | OPSCDSysReacLo | 2-3-1 | 100 | 1, 11 | ● |
| 200 | Override switch | Switch hangs | ● | ● | OSwCD | 1-4-5 | 1237 | 2, 11 | ● |
| 201 | Oil temperature sensor | Cable break or short circuit | ● | ● | OTSCD | 1-4-4 | 175 | 2, 3, 4 | ● |
| 203 | Oil temperature | Below target range with system reaction | ● | ● | OTSCDSysReac | 1-4-4 | 175 | 0, 11 | ● |
| 208 | Rail pressure limiting valve | Opening failure | ● | | PRVMon | 1-4-6 | 523470 | 2, 11, 12, 14 | |
| 209 | Rail pressure sensor | Cable break or short circuit | ● | | RailCD | 1-4-7 | 157 | 3, 4, 11 | |
| 210 | Rail pressure sensor | Deviation of signal during start or after-run above target range | ● | | RailCDOfsTst | 1-4-7 | 157 | 0, 1, 11 | ● |
| 211 | Rail pressure | Positive deviation (speed dependent) outside target range | ● | | RailMeUn0 | 1-3-4 | 523613 | 0, 11 | ● |
| 212 | Rail pressure | Positive deviation (flow dependent) outside target range (⇨ leakage!) | ● | | RailMeUn1 | 1-3-4 | 523613 | 0, 11 | ● |
| 213 | Rail pressure | Negative deviation (flow dependent) outside target range | ● | | RailMeUn2 | 1-3-4 | 523613 | 0, 11 | ● |
| 214 | Rail pressure | Negative deviation (speed dependent) outside target range | ● | | RailMeUn3 | 1-3-4 | 523613 | 1, 11 | ● |
| 215 | Rail pressure | Pressure above target range | ● | | RailMeUn4 | 1-3-4 | 523613 | 0, 11 | ● |
| 216 | Rail pressure | Implausible (leakage, injector needle blocked in open position) | ● | | RailMeUn7 | 1-3-4 | 523613 | 2, 11 | ● |
| 218 | ECU internal error | Redundant shut-off conditions detected | ● | ● | SOPTst | 1-4-9 | 523490 | 3, 4, 11, 12 | |
| 219 | ECU internal error | Wrong voltage of internal 5V reference source 1 | ● | ● | SSpMon1 | 2-8-2 | 1079 | 3, 4, 11 | ● |
| 221 | ECU internal error | Wrong voltage of internal 5V reference source 2 | ● | ● | SSpMon2 | 2-8-2 | 1080 | 3, 4, 11 | ● |
| 222 | ECU internal error | Wrong voltage of internal 5V reference source 3 | ● | ● | SSpMon3 | 2-8-2 | 523601 | 3, 4, 11 | ● |
| 223 | Start relay | Start relay (high side): short circuit | ● | ● | StrtCDHS | 5-1-2 | 677 | 3, 4, 11 | |
| 224 | Start relay | Start relay (low side): cable break or short circuit, disabled by ECU | ● | ● | StrtCDLS | 5-1-2 | 677 | 3, 4, 5, 11 | |
| 225 | Diagnostic lamp | Cable break or short circuit, disabled by ECU | ● | ● | SysLamp | 5-1-3 | 624 | 2, 3, 4, 5 | |
| 226 | Terminal 15 | Ignition ON not detected | ● | ● | T15CD | 5-1-4 | 158 | 11, 12 | |
| 227 | Terminal 50 | Engine start switch hangs | ● | ● | T50CD | 5-1-5 | 523550 | 11, 12 | |
| 228 | ECU internal error | Time processing unit (TPU) defective | ● | ● | TPUMon | 5-5-5 | 523550 | 2, 11 | |
| 232 | Vehicle speed signal | Speed above target range, signal missing or implausible | ● | ● | VSSCD1 | 5-2-1 | 84 | 0, 8, 12, 14 | ● |
| 235 | ECU internal error | Serial communication interface defective | ● | ● | WdCom | 5-5-5 | 523600 | 11, 12 | |
| 236 | Rail pressure limiting valve | Opening failure with system reaction | ● | | PRVMonSysReac | 1-4-6 | 523470 | 11, 12 | |

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## 172 / 657 / InjVlvCyl7B

**Error description INJECTOR 7**
Injector 7: the current drain measured by ECU is underneath the target range

**Error codes**
**DEUTZ-Errorcode:** 172
**BlinkCode** (short-long-short): 1 - 6 - 4
**SPN:** 657
**possible FMI:**
13: out of calibrated range
13: out of calibrated range
5: current to low or broken wire
13: out of calibrated range

**Errordetection**
Errorlamp shows permanent light. Entry in errormemory.

**Possible reason for error**
Cable break (cylinder 7), injector defective, connection cable demaged

**Take actions for error repair**
Check cabling, check injectors and if necessary replace them, check connection cable and if necessary repair or replace it

**other error properties**
System reaction: Warning, fuel injection failed, shut off wenn the number of active cylinders below minimum
Behaviour error lamp: permanent light
Selfhealing: yes
Signal Priority: 3
Measurement @ errortime: actual value

## 173 / 658 / InjVlvCyl8A

**Error description INJECTOR 8**
Injector 8: the current drain measured by ECU is above the target range

**Error codes**
**DEUTZ-Errorcode:** 173
**BlinkCode** (short-long-short): 1 - 6 - 5
**SPN:** 658
**possible FMI:**
3: Voltage to high or short circuit to +Ubatt
13: out of calibrated range
4: Voltage to low or short circuit to -Ubatt
12. Errormode not identifiable

**Errordetection**
Errorlamp shows permanent light. Entry in errormemory.

**Possible reason for error**
Short circuit (cylinder 8), injector defective, connection cable demaged

**Take actions for error repair**
Check cabling, check injectors and if necessary replace them, check connection cable and if necessary repair or replace it

**other error properties**
System reaction: Warning, fuel injection failed, shut off wenn the number of active cylinders below minimum
Behaviour error lamp: permanent light
Selfhealing: yes
Signal Priority: 4
Measurement @ errortime: actual value

## 174 / 658 / InjVlvCyl8B

**Error description INJECTOR 8**
Injector 8: the current drain measured by ECU is underneath the target range

**Error codes**
**DEUTZ-Errorcode:** 174
**BlinkCode** (short-long-short): 1 - 6 - 5
**SPN:** 658
**possible FMI:**
13: out of calibrated range
13: out of calibrated range
5: current to low or broken wire
13: out of calibrated range

**Errordetection**
Errorlamp shows permanent light. Entry in errormemory.

**Possible reason for error**
Cable break (cylinder 8), injector defective, connection cable demaged

**Take actions for error repair**
Check cabling, check injectors and if necessary replace them, check connection cable and if necessary repair or replace it

**other error properties**
System reaction: Warning, fuel injection failed, shut off wenn the number of active cylinders below minimum
Behaviour error lamp: permanent light
Selfhealing: yes
Signal Priority: 3
Measurement @ errortime: actual value

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### Closed circuit

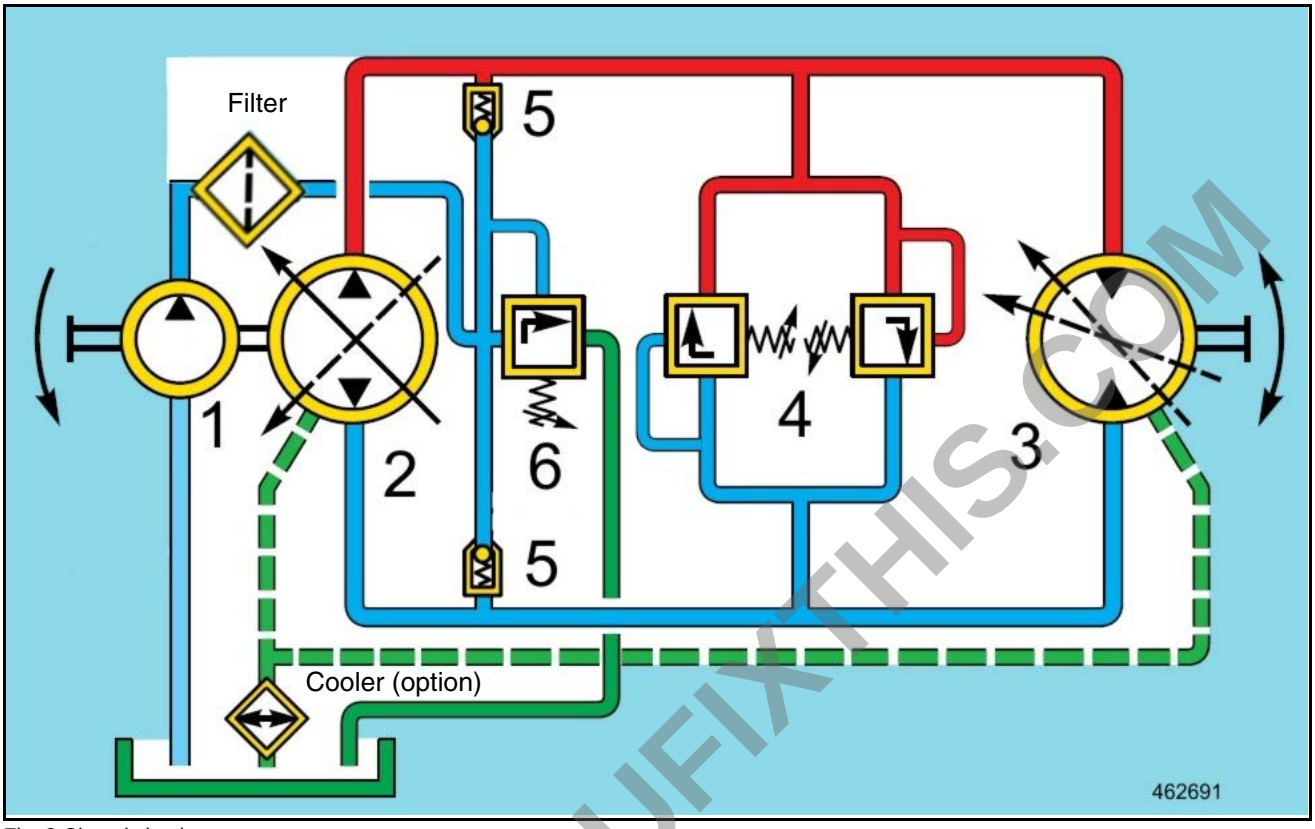



Fig. 2 Closed circuit

One talks about a closed hydraulic system, when the hydraulic oil flows from the **consumer** (3) (Fig. 2) directly back to the **pump** (2).

The closed circuit consists of a high and a low pressure side, depending on the load direction (take-off moment on the consumer).

The high pressure side is protected by **pressure relief valves** (4), which release oil into the low pressure side. The medium remains in the circuit.

Only the permanent leakage on pump and motor needs to be replenished. This is accomplished by a **charge pump** (1), which permanently delivers a sufficient amount of fluid (charge capacity) through a **check valve** (5) into the low pressure side of the closed circuit. Any excess oil delivered by the charge pump, which works in an open circuit, runs through a **charge pressure relief valve** (6) back into the tank. Charging the low pressure side enables the **pump** (2) to work with higher operating data.

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| | | | |
|---|---|---|---|
| 01 | Vibration pump | 1.4 | Charge pump |
| 1.1 | Charge pressure relief valve | 08 | Vibration motor |
| 1.2 | Charge pressure relief valve | 09 | Flushing valve |
| 1.3 | High pressure relief valves | | |

## Vibration motor

The vibration motor is a fixed displacement motor.

**BW213/214/216 DH/PDH** A2FM56.

**BW219 DH/PDH** A2FM63.

**BW226 DH/PDH** A2FM80.

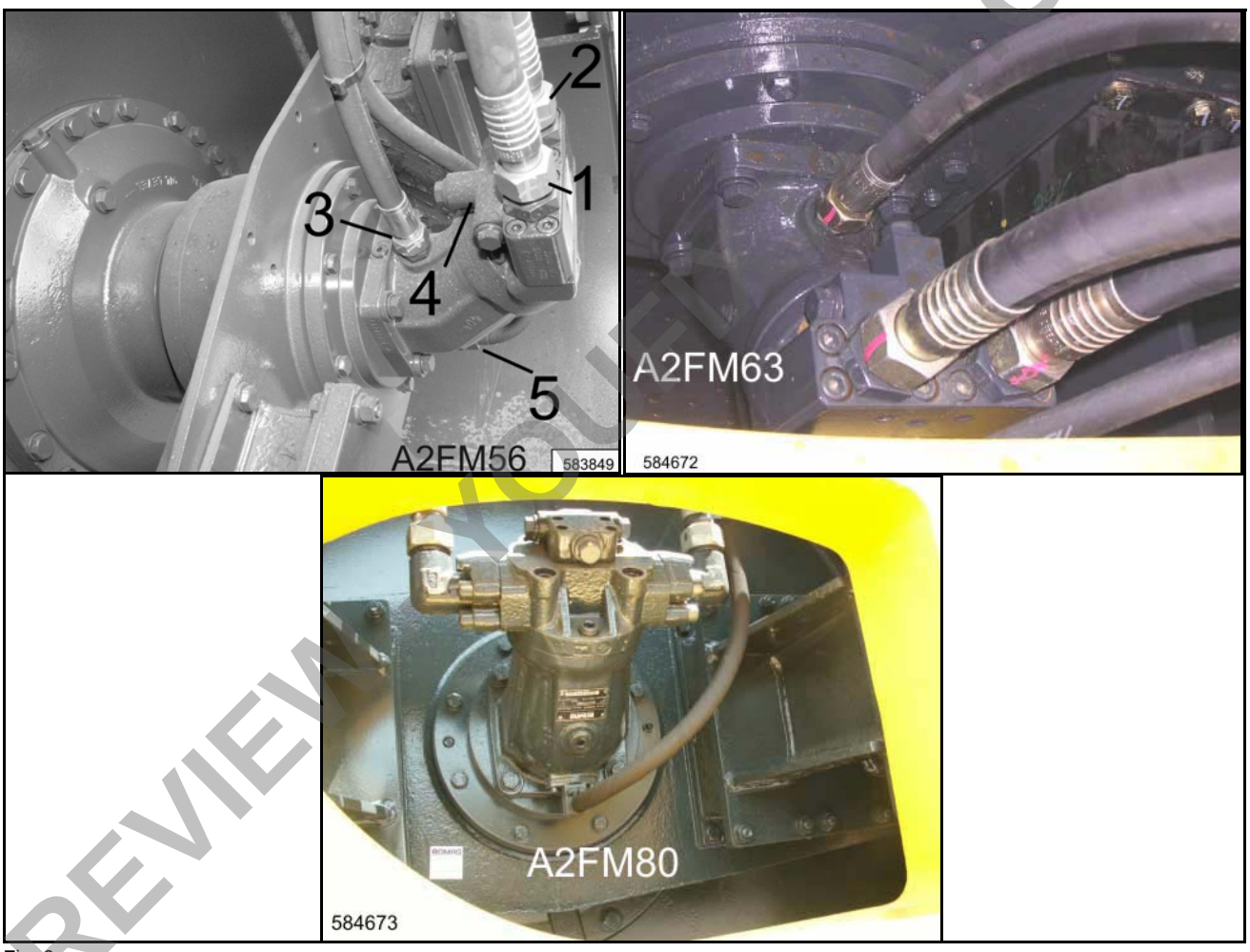



Fig. 6

| | | | |
|---|---|---|---|
| 1 | High pressure port, low amplitude | 4 | Flushing valve, flushing quantity approx. 8-10 litres |
| 2 | High pressure port high amplitude | 5 | Speed sensor, B16 |
| 3 | Leak oil and flushing port | | |

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## 11.8 Bleeding the vibration circuit

**Environment**

**Catch hydraulic oil and dispose of environmentally.**

1. Install a pressure test hose to the charge pressure test port (M1).
2. Install a pressure test hose each to the high pressure test ports (M5 and M6).
3. Actuate the emergency stop switch.

**Danger**

**The engine should not start.**

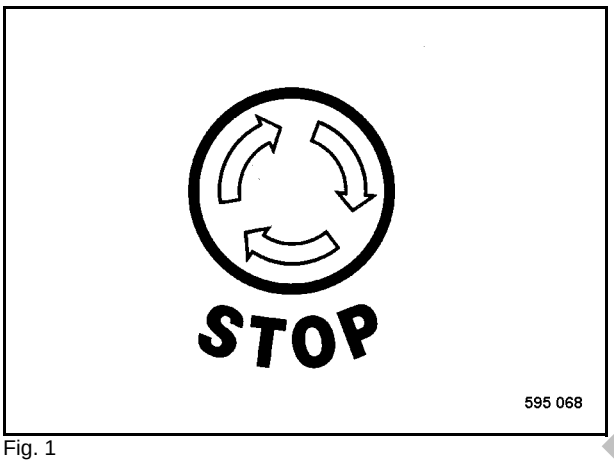



Fig. 1

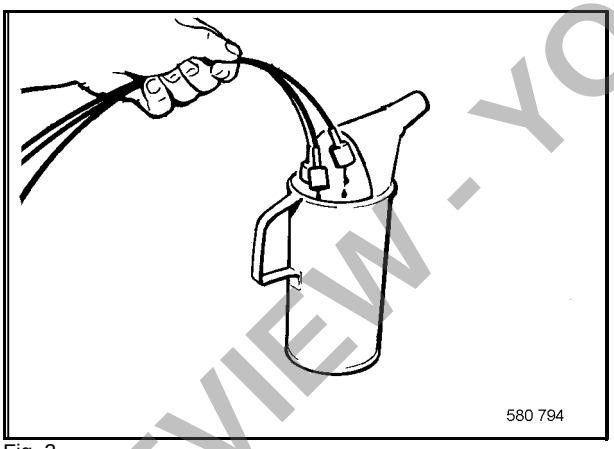



Fig. 2

4. Hold the open ends of the pressure test hoses (Fig. 2) into a container.
5. Crank the engine approx. 10 seconds with the starter motor. Wait one minute and keep repeating this procedure, until oil starts to run out from the pressure test hoses.
6. Disconnect the pressure test hoses (M5 and M6).

7. Unlock the emergency stop switch

**Danger**

**Apply the brake.**

8. Connect a 60 bar pressure gauge to the charge pressure test port (M1) and run the engine max. 15 seconds at idle speed.
9. Wait for approx. 30 seconds and repeat the procedure, until the pressure gauge shows a constant charge pressure.

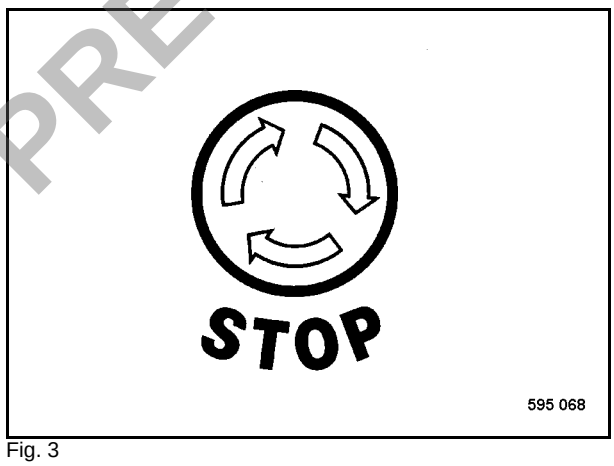



Fig. 3

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## 12.25Engine conservation

If the engine is to be shut down for a longer period of time (e.g. over winter), please consult the service department of the engine manufacturer for further details.

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19 Pressure reducing valve
20 Vacuum pump
21 Nitrogen bottle
22 Refrigerant bottle
23 Pressure gauge bar

## Filling instructions

1 Connect the service adapter with the blue hand wheel in the suction side.
2 Connect the service adapter with the red hand wheel in the pressure side (the hand wheels on the service adapters must be fully backed out - left hand stop)
3 Connect the blue suction hose below the blue hand wheel on the pressure gauge bar to the blue service adapter.
4 Connect the red pressure hose below the red hand wheel on the pressure gauge bar to the red service adapter.
5 Connect the yellow hose below the yellow hand wheel on the manometer bar to the 2-stage vacuum pump.
6 Connect the last hose below the black hand wheel on the nitrogen bottle via the pressure reducing valve.
7 Check on the pressure gauge bar that all hand wheels are closed.
8 Turn the hand wheels on both service adapter clockwise. This opens the valves (right hand stop).
9 Open the valve on the nitrogen bottle (only via pressure reducer); pressure approx. 20 bar.
10 Open the black and red hand wheels on the pressure gauge bar and fill nitrogen into the system, until a pressure of approx. 3.5 to 5.0 bar is indicated on the suction side.
11 Then open the blue hand wheel and raise the pressure in the suction side (max. 10 bar). Check for leaks with a leak detection fluid or soapsuds.
12 If the system is leak tight, release the nitrogen from the system. For this purpose disconnect the hose from the nitrogen bottle and open the red, blue and black hand wheels on the pressure gauge bar.
13 Then connect the hose to the refrigerant bottle.
14 Switch on the vacuum pump and open all hand wheels on the pressure gauge bar. In case of a leak no or only an insufficient vacuum will be reached. In this case proceed as described under point 9-12. Once the leak is sealed continue with point 14.
15 Once a sufficient vacuum is reached, both pressure gauges show -1, close all hand wheels on the pressure gauge bar.
16 Switch off the vacuum pump, watch the pressure gauges to see whether the vacuum is maintained.
17 Open the valve on the refrigerant bottle and open the black and red hand wheels on the pressure gauge bar. Fill refrigerant into the system, until a pressure equilibrium between suction and pressure side is reached (reading of pressure gauges).
18 Close the red hand wheel.
19 Perform a leak test with the electronic leak detector.
20 Start the engine and switch on the system.
21 Open the blue hand wheel and continue filling in refrigerant until the inspection glass is free or air bubbles (in fluid container/dryer combinations the white pearl should float in the upper third of the inspection glass). Then close the refrigerant bottle.
22 Close the blue hand wheel on the pressure gauge bar.
23 Preparing the test run: -Close windows and doors -Fan on full speed stage -Mount measuring feelers to air discharge and air intake.
24 Run the system for approx. 20 minutes with medium engine speed.
25 The temperature difference between air discharge and air intake should be (depending on type of air condition) 8-10°C. The ambient temperature thereby is approx. 20°C. (These data are only reference values, which may be influenced by possible insolation)
26 Switch off system and engine and check for leaks again.
27 Turn out (left hand stop) and remove the hand wheels on both service adapters.
28 Fit all valves with dust caps.
29 Perform a leak test.
30 Mark the system with the corresponding type plates and information decals, such as type of oil and refrigerant.

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## 15.2 Hydraulic diagram 31

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